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230. Proposed by G. W. GREENWOOD, M. A. (Oxon), Lebanon, Ill.

Find the value of the determinant of n rows,

$$\begin{vmatrix} 5 & 2 & 0 & 0 & 0 & \cdots\cdots \\ 2 & 5 & 2 & 0 & 0 & \cdots\cdots \\ 0 & 2 & 5 & 2 & 0 & \cdots\cdots \\ 0 & 0 & 2 & 5 & 2 & \cdots\cdots \\ 0 & 0 & 0 & 2 & 5 & \cdots\cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots\cdots \end{vmatrix}$$

[Oxford, 1900.]

Solution by the PROPOSER.

Denote the determinant by u_n. Then $u_n=5u_{n-1}-4u_{n-2}$.
Let $S=u_1+u_2x^2+u_3x^2+\ldots\ldots$ Then

$$(1-5x+4x^2)S=u_1+(u_2-5u_1)x=5-4x.$$

$$S=\frac{5-4x}{1-5x+4x^2}=\tfrac{1}{3}\left[\frac{16}{1-4x}-\frac{1}{1-x}\right].$$

Then $u_n=\text{co}\,x^{n-1}$ in $S=\frac{1}{3}[4^{n+1}-1]$.

Also solved by M. E. Graber.

231. Proposed by O. L. CALLECOT, Omaha, Neb.

Sum to infinity: $\dfrac{1}{2.3.4}+\dfrac{1}{5.6.7}+\dfrac{1}{8.9.10}+\ldots\ldots$

Remark by Editor EPSTEEN.

Mr. A. H. Holmes notes that

$$\frac{2}{(2+x)(2+x+1)(2+x+2)}=\frac{1}{2+x}-\frac{2}{2+x+1}+\frac{1}{2+x+2}$$

and then substitutes $x=0, 1, 2, \ldots\ldots$ From this point on it seems to me that his solution should proceed thus:

$$\frac{1}{1.2.3}+\frac{1}{5.6.7}+\frac{1}{8.9.10}+\ldots\ldots$$

$$\begin{aligned} &=\tfrac{1}{2}-\tfrac{2}{3}+\tfrac{1}{4}\\ &\qquad+\tfrac{1}{3}-\tfrac{2}{4}+\tfrac{1}{5}\\ &\qquad\qquad+\tfrac{1}{4}-\tfrac{2}{5}+\tfrac{1}{6}\\ &\qquad\qquad\qquad+\tfrac{1}{5}-\tfrac{2}{6}+\tfrac{1}{7}\\ &\qquad\qquad\qquad\quad\vdots\qquad\quad\vdots \end{aligned}$$

$$=\tfrac{1}{2}-\tfrac{1}{3}=\tfrac{1}{6}.$$

232. Proposed by F. P. MATZ, Sc. D., Ph. D., Reading, Pa.

If one person out of 50 die annually and one person out of 30 is born annually, how long at this rate would be required for the population to treble itself?